IDENTIFYING AND EXPLAINING FARMS TYPOLOGIES BASED ON STRATEGIC REACTION TO POLICY

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Paper prepared for presentation at the 114th EAAE Seminar
'Structural Change in Agriculture', Berlin, Germany, April 15 - 16, 2010

 The research reported in this paper was funded by the European Commission within the project "Assessing the multiple Impacts of the Common Agricultural Policies (CAP) on Rural Economies" (CAP-IRE), 7th Framework Programme, contract n.

216672 (www.cap-ire.eu). However the paper does not necessarily reflect the views of the EU and in no way anticipates the Commission's future policy in this area.

ABSTRACT

In most studies, single policy reaction variables are explained through a number of personal, family or structural variables. The objective of this paper is to identify consistent "strategic change profiles" across EU farm (-households), based on stated intentions of change under different policy scenarios. The analysis is carried out using a multinomial logit model (MNL) over a sample of over 2000 farms. Qualitative (contract and chain-based) expansion strategies are better explained than exit and quantitative expansion strategies. The single farm payment amount, labour and living on farm are the most relevant and consistent explanatory variables.

Keywords: CAP, farm strategy, MNL

1. INTRODUCTION AND OBJECTIVES

The European Union (EU) agriculture is undergoing major structural changes, which are expected to continue in the foreseeable future. The Common Agricultural Policy (CAP) of the EU is a major determinant of such changes. Several studies addressed the issue of structural change and farm/farm-household structural reaction to policy reforms in the European Union, based on survey information. In most cases, single policy reaction variables are explained through a number of personal, family or structural variables. In additional, most studies focus on a narrow concept of structural change, mostly related to farm size either expressed by land, labour or capital use. However, the dynamics of farm change are requiring attention to more and more complex variables, which also include strategies connected with access to factors in flexible ways (credit, land leasing) and to stabilising market connections with downstream and "peer" agents through production contracts, partnerships etc. We can use the whole configuran of these components to identify different farm strategies. A mostly lacking issue in the literature is the understanding of how the CAP as a whole affects this aggregated farm strategies.

The objective of this paper is to identify consistent "strategic change profiles" across EU farm (-households), based on stated intentions of change under different policy scenarios, and to explain the choice of such strategic profiles. The paper builds on a survey of over 2000 farms in 9 EU countries. Reactions to policy are elicited through stated behaviour facing two main scenario: a) a baseline scenario based on the current CAP; b) an alternative scenario providing the total removal of the CAP. Answers are treated through a Multinomial logit model.

The remainder of the paper is organised as follows: in section 2 a short literature review is provided; in section 3 the methodology is described; in section 4 we illustrate the main results, while in section 5 the paper closes with a short discussion.

2. LITERATURE

A few papers are available about intended reactions to policy changes. For example, Tranter et al. (2007), in analyzing farm reaction to decoupling, considered different reaction options, finding a major importance for choices related to land abandonment. Douarin et al. (Deliverable 4 IDEMA) illustrates the results of a comparison between different policy options through stated reactions by farmers and try to explain such reactions. Gallerani et al. (2008) evaluate ex-post the effect of the 2003 decoupling based on survey data and analyze ex-ante the impact of policy scenarios. The results emphasize the importance of policy support and market prices in determining the viability of agricultural systems. At the same time the importance of personal and household characteristics in determining the reaction to policy is also highlighted, hence confirming the outcome of previous studies, particularly those concerning investment behaviour. Genius et al (2008) present a survey of farmers' intentions facing 2003 CAP reform and in the light of three future price scenarios (-10%, ==, +10%). The survey concerns three regions in Greece, the Netherlands and Hungary and is based on a sequential discrete choice approach. Future intentions about input use, labour use, size of business, investment levels and output diversification were addressed. About 60% of Greek farmers state that they would abandon the farming activity if the price decreases by 10%. This share reduces to 28% in Hungary, and 18% in Holland. The authors also develop an econometric model to explain the choice of abandoning farming, of increasing acreage/livestock size or of keeping the same mix for the three countries. In the cases of Hungary and Greece, small farms are more likely to abandon, while in the case of Holland the opposite occurs. More specialised farms are more likely to abandon production in Greece and Hungary while in Holland they are less likely to abandon production.

However, in most of literature considered, different farm choices facing policies are considered and explained in "isolation" (e.g. Raggi et al., 2008). In this paper, on the contrary, we use different patterns of reaction to policy as a key for farm-household classification and, in doing so, we interpret such patterns of reaction as different farm strategies, i.e. aggregated long term farm choice over a number major decision variables.

3. DATA SOURCES, THE MODEL AND IMPLEMENTATION

The data used come from a survey of about 2000 individual farm-household from 9 countries in the EU, carried out in 2009. The survey was made using several ways for interviewing, depending on the country: face-to-face (52%), telephone (34%) or postal (13%). The larger part of respondents was selected from the list of beneficiaries of SFP payments in.

The survey asked farmers about their intended behaviour on a number of dimensions (structural, organisational, environmental) in two different scenarios: a baseline scenario represented by the policy in place in 2009 and an alternative No-CAP scenario, assuming the complete removal of the CAP.

The main characteristics of the sample are summarised in Table 1. These descriptive statistics denote a large variability between countries about land size (land owned plus land rent-in), the amount of payments received and the age of respondent. In general, the acreage of land size is bigger than the median, which implies that there are in the country a few farms whith a large size; the same pattern is evident for payments; on the contrary, for age there is not a large gap between the mean and the median.

Table 1 about here

Based on the answers to the questionnaire, farm-households are first classified according to their exit strategy in three groups: a) those quitting farming whatever the scenario; b) those quitting farming only in the No-CAP scenario; c) those staying in farming whatever the scenario. In a second step, groups b) and c) are further classified according to their prevailing strategy, in four groups: 1) those pursuing a “quantitative” strategy based on increase of capital endowment (land owned, buildings and machineries); 2) those pursuing a “qualitative” strategy based on embedding of the farm into the economic environment through contracting and the use of credit; 3) those pursuing a mixed strategy based on both of the previous; 4) others. This results in a 9-group classification determined by a combination of the policy reaction and of the main strategic attitude.

The percentage of answer to the policy scenario is given in Table 2. The percentage of the policy reactions is heterogeneous between countries. It is interesting underlining that those

quitting farming in both scenario is around 15% (with a variability between countries from 25% in Spain and in the second case study of France to 4% in Poland), At the same time, differences appear evident between the shares of those staying only in the baseline scenario and those staying whatever. In the second part of Table 2, the percentage of those adopting one of the two strategies, when staying in one of the policy scenario, is showed.

Table 2 about here

The determinants of farm-household strategic behaviour according to each of the two classification criteria described above are analysed using a multinomial logit model (MNL).

The main idea of the MNL model is the possibility to investigate which are the determinants that affect the probability to stay in one group. It is assumed that the intention to stay in one group depends on the utility that the individual obtained from that choice. The indirect utility function can be decomposed in a deterministic part *V* (observable) which is a linear combination of *p* variables and an error part ε (not observable). Estimations are possible making two assumptions: errors are i.i.d. with a Gumble distribution (extreme value distribution Type 1) and homogeneity holds between the groups of each individual. When these assumptions hold, the multinomial logit model (MNL) is returned, then the probability of *i-th* farms of stay in group *k* between a set of *J* groups can be expressed as follows:

$$\Pr_i(k) = \frac{\exp(x_{ij}\beta)}{\sum_{j=1}^{J} \exp(x_{ij}\beta)} \qquad (1)$$

The positive/negative sign of β coefficient, when significant, can be interpreted as the increment/decrement of the probability of being with the specific group compared to a reference categories.

4. RESULTS

The main results from the MNL model are reported in Table 3, considering all 9 groups. The negative (positive) sign means a negative (positive) effect of the covariate on the probability to stay in one group with respect to the reference group. In our case the group of those

quitting in both scenario represents the reference group. As a consequence, this group is not included in the table.

Table 3 about here

The preliminary analysis shows that for groups 1, 2 and 3 there is no presence of significant covariates to explain the behaviour, but for the other groups there are several covariates that can identifying the probability to be in one of the groups.

A high amount of the SFP in 2008 increases the probability to stay in group 4, 6 and 7. It is reasonable thinking that those who have a large amount of SFP are willing to stay in the CAP scenario (group 4), but, in addition, this is connected to the adoption of a non-neutral strategy. This would be a mixed strategy for those staying only in the CAP scenario, while farms would split between a more quantitative and a more qualitative strategy when staying in the NO-CAP scenario (groups 6 and 7). An increasing of the share of labour used in other activities affects positively the probability to stay in group 5 and 7.

An increasing presence of female in the family reduces the probability to stay in groups 4, 7 and 8 which are groups adopting at least one strategy, which likely hints at the persistency of a different gender attitude towards farming activities. Groups 6 and 7 have a large quantity of significant covariates, in particular for farm-households classified in group 6 only SFP has a positive effect while being in plain, less favoured areas (lfa) and non less favoured areas (no-lfa) areas have a negative effect; for farm-household classified in group 7, the amount of SFP, the fact of living on farm, the presence of youth in the family, an high income from farm activity and the share labour used in other activities are positive and significant covariates.

5. DISCUSSION

The descriptive results of the classification proposed in this paper and the outcome of the MNL highlight the relevance of the groups preliminarily identified. In the three-way classification, in particular, about ¼ of the households would exit farming in the next ten years and about the same share would further exit if the CAP was removed. Using the second classification grid, the main descriptive outcome is that in both groups b) and c) about 50% of the farms pursue either strategy 1 or 2 or both with a rather even distribution. However,

“qualitative” strategies seem to be more important for farms in group c) compared to b), hinting at the idea that the most policy dependent farms are also those with the lowest profile in terms of long term improvement of their organisational and production processes, i.e. basically improvements based on scale increase. On the contrary, less policy dependent farms are those with a more varied strategy base on an increased connectiveness with their business context.

The main determinants of the different behaviour alternatives are those connected to the household (number of full time household members working on-farm), the farm (size and specialisation) and the country. The latest may actually account for different components, including the institutional and economic environment and structural characteristics not directly expressed in the model. However the explanatory capacity of the variables considered appear rather poor for the typologies willing to continue only in the CAP scenario, while there appear more significant variables to explain the behaviour of those staying in farming even without the CAP. This likely hints at the higher characterisation of the latter with respect to the variables that affect farming viability and strategy.

In terms of policy implications, the results draw attention on the need for a deeper understanding of the qualitative effects of policy in terms of typology selection and its connection with the emerging farm strategies.

The main drawback of the exercise performed in this paper is the simplified approach to the definition and measurement of farm strategies in terms of the number of related variables and the weak connection with theoretically based characterisation of the different strategies. A straightforward development of this paper is hence in the direction of a more sound definition of strategic reactions to policy, possibly based on grouping techniques applied to a wider range of policy reaction variables.

REFERENCES

Revoredo-Giha, C. and Leat, P. (2008). Red meat producers’ preferences for strategies to cope with the CAP reform in Scotland. 109th EAAE Seminar "The CAP after the fischler reform: National implementations, impact assessment and the agenda for future reforms". Viterbo, Italy.

Tranter, R. B., Swinbank, A., Wooldridge, M. J., Costa, L., Knapp, T., Little, G. P. J., and Sottomayor, M. L. (2007). Implications for food production, land use and rural development of the European Union's Single Farm Payment: Indications from a survey of farmers' intentions in Germany, Portugal and the UK. Food Policy 32: 656–671.

Douarin, E., Bailey, A., Davidova, S., Gorton, M. and Latruffe, L. (2007). Structural, location and human capital determinants of farmers' response to decoupled payments, D14 Working Paper, IDEMA project.

Gallerani, V., Gomez y Paloma, S., Raggi, M., Viaggi, D. (2008). Investment behaviour in conventional and emerging farming systems under different policy scenarios. JRC Scientific and technical reports, EUR 23245 EN – 2008.

Raggi, M., Viaggi, D. and Gomez y Paloma, S. (2008). Understanding the determinants of investment reactions to decoupling, 109th Seminar of the European Association of Agricultural Economists (EAAE) "The Cap After the Fischler Reform: National Implementations, Impact Assessment and the Agenda for Future Reforms, Viterbo (Italy), 20/21 November 2008.

Table 1 Main characteristics of the respondents

Country	Land size (ha)		Sfp (€/year)		Age	
	Mean	Median	Mean	Median	Mean	Median
IT	20.5725	11	6952.6695	2000	59.48	60
GR	8.90982	6	10576.632	8000	48.53	48
PL	19.5495	16.7	2651.4458	2000	35.13	33
UK	180.665	104.45	40906.29	19961.6	55.39	55
ES	73.8489	15	18150	7500	53.91	54
BG	16.0634	6	19794.072	4000	46.98	46
FR1	79.4401	61	42276.857	39750	35.78	33
FR2	81.8501	66	20550.171	15000	43.66	46
DE1	10.9707	6.5	9056.2159	3600	49.96	51
DE2	114.488	31	84155.635	18822.77	51.97	51
Total	51.9812	15	21302.891	5624.5	48.00	48

Table 2 Main reaction to the policy scenario (% by country)

Country	Exit in both scenario	Stay only in CAP	Stay in both scenario	Qualitative strategy		Quantitative strategy	
				CAP	No-CAP	CAP	No-CAP
IT	18.03	13.52	68.44	4.33	10.33	27.00	12.33
GR	9.51	57.75	32.75	8.33	2.00	18.00	7.00
PL	3.64	11.34	85.02	3.21	44.98	64.26	14.06
UK	9.35	20.56	70.09	20.83	19.64	29.76	18.45
ES	24.86	37.57	37.57	20.40	13.43	24.38	9.45
BG	16.22	22.97	60.81	61.54	29.30	71.06	31.87
FR1	12.96	26.85	60.19	23.57	20.00	45.00	31.43
FR2	25.47	22.64	51.89	20.00	17.42	37.42	21.94
DE1	17.02	56.38	26.60	19.66	5.13	41.03	6.84
DE2	11.81	47.92	40.28	32.50	9.38	55.63	13.75
Total	14.10	31.15	54.75	20.79	17.69	41.01	16.38

Table 3 Results from the MNL model

	Keep farming in:	CAP				CAP and No-CAP			
Strategy	Quantitative	no	yes	no	yes	no	yes	no	yes
adopted	Qualitative	no	no	yes	yes	no	no	yes	yes
	Group	1	2	3	4	5	6	7	8
	(obs.)	(285)	(112)	(38)	(106)	(496)	(146)	(164)	(145)
Significant variables	No Lfa				-	-	-	-	
	Lfa						-	-	
	Plain location						-		
	Worker full time male					+		-	
	Worker part time male							-	
	Worker part time female					-			
	Sfp in 2008				+		+	+	
	Land owned				-			-	
	Limited liability companies				-				
	Share labour					+		+	
	High income							+	
	n. young							+	
	n.female				-			-	-
	live on				+			+	